

What is claimed is:

[Claim 1] A valve assembly for use in a well, comprising:
an outer housing;
an inner housing movable with respect to the outer housing and disposed within the outer housing, the inner housing having a hollow interior, and one of the outer housing and the inner housing having a plurality of radial flow passages; and
a sealing device disposed between the inner housing and the outer housing, the sealing device having a primary seat and a secondary seat, at least one of the primary seat and the secondary seat being formed of a harder material than the other.

[Claim 2] The valve assembly as recited in claim 1, wherein the sealing device comprises a sliding seal.

[Claim 3] The valve assembly as recited in claim 1, wherein at least one of the primary seat and the secondary seat is formed of a deformable material.

[Claim 4] The valve assembly as recited in claim 3, wherein the deformable material comprises PEEK.

[Claim 5] The valve assembly as recited in claim 2, wherein at least one of the primary seat and the secondary seat has a hardness of at least 1,200 knoops.

[Claim 6] The valve assembly as recited in claim 1, further comprising:

an orifice insert disposed within at least one of the radial flow passages, the orifice insert having a passageway therethrough.

[Claim 7] The valve assembly as recited in claim 1, wherein the primary seat comprises a carbide material.

[Claim 8] The valve assembly as recited in claim 1, wherein the primary seat comprises a tungsten-carbide material.

[Claim 9] The valve assembly as recited in claim 1, wherein the primary seat comprises a hardened steel material.

[Claim 10] The valve assembly as recited in claim 1, wherein the primary seat comprises a ceramic material.

[Claim 11] The valve assembly as recited in claim 1, wherein the primary seat comprises a vapor deposition diamond material.

[Claim 12] The valve assembly as recited in claim 1, wherein the primary seat comprises a polycrystalline diamond material.

[Claim 13] The valve assembly as recited in claim 1, wherein the secondary seat is formed of a plastic material.

[Claim 14] The valve assembly as recited in claim 2, wherein the sliding seal comprises a flow restrictor ring.

[Claim 15] The valve assembly as recited in claim 2, wherein the sliding seal comprises a seat retainer.

[Claim 16] The valve assembly as recited in claim 1, further comprising a choke stop positioned to engage the primary seat and the secondary seat when the sealing device is in a closed position.

[Claim 17] A valve assembly, comprising:

an outer housing sized for insertion into a wellbore; an inner housing slidably disposed within the outer housing, the inner housing having a radial flow passage to enable flow of fluid to an interior of the inner housing; and

a sealing device disposed between the inner housing and the outer housing to control flow through the radial flow passage, the sealing device having at least two different materials that form a seal with a choke stop positioned on one of the outer housing and the inner housing.

[Claim 18] The valve assembly as recited in claim 17, wherein the radial flow passage comprises a plurality of flow passages that move sequentially past the sealing device when the outer housing and the inner housing are moved relative to each other.

[Claim 19] The valve assembly as recited in claim 18, wherein the plurality of flow passages are of different sizes.

[Claim 20] The valve assembly as recited in claim 17, wherein the sealing device comprises a primary seat of a first material and a secondary seat of a second material.

[Claim 21] The valve assembly as recited in claim 20, wherein the second material comprises a plastic material.

[Claim 22] The valve assembly as recited in claim 20, wherein the second material is deformable.

[Claim 23] The valve assembly as recited in claim 20, wherein the second material comprises PEEK.

[Claim 24] The valve assembly as recited in claim 20, wherein the first material comprises a carbide material.

[Claim 25] The valve assembly as recited in claim 20, wherein the first material comprises a tungsten–carbide material.

[Claim 26] The valve assembly as recited in claim 20, wherein the first material comprises a hardened steel material.

[Claim 27] The valve assembly as recited in claim 20, wherein the first material comprises a ceramic material.

[Claim 28] The valve assembly as recited in claim 20, wherein the first material comprises a vapor deposition diamond material.

[Claim 29] The valve assembly as recited in claim 20, wherein the first material comprises a polycrystalline diamond material.

[Claim 30] The valve assembly as recited in claim 18, wherein the plurality of flow passages are defined by a plurality of hardened inserts.

[Claim 31] A method of controlling fluid flow, comprising:
constructing a valve assembly with an inner housing slidably disposed within an outer housing;

providing a flow passage through the inner housing to enable flow between an exterior and interior of the inner housing; and
utilizing a primary seat having a first material hardness and a secondary seat having a second material hardness to form a seal between the inner housing and the outer housing when the valve assembly is closed.

[Claim 32] The method as recited in claim 31, further comprising coupling the valve assembly to a wellbore completion.

[Claim 33] The method as recited in claim 31, further comprising coupling the valve assembly to an electric submersible pumping system.

[Claim 34] The method as recited in claim 31, further comprising moving the valve assembly into a wellbore.

[Claim 35] The method as recited in claim 31, further comprising locating a choke stop on the inner housing for sealing engagement with the primary seat and the secondary seat.

[Claim 36] The method as recited in claim 31, further comprising forming the secondary seat from a plastic material.

[Claim 37] The method as recited in claim 31, further comprising forming the secondary seat from a PEEK material.

[Claim 38] The method as recited in claim 36, further comprising forming the primary seat from a metal material.

[Claim 39] The method as recited in claim 36, further comprising forming the primary seat from a ceramic material.

[Claim 40] The method as recited in claim 36, further comprising forming the primary seat from a diamond material.

[Claim 41] The method as recited in claim 31, wherein utilizing comprises positioning the primary seat and the secondary seat on a sliding seal.

[Claim 42] The method as recited in claim 41, wherein providing comprises providing a plurality of flow passages across which the sliding seal moves sequentially to increase or decrease flow as the inner housing is moved relative to the outer housing.

